NITROGEN FLUX IN A SPONGE-MACROALGAL SYMBIOSIS. *Memoirs of the Queensland Museum 44: 124. 1999*:- Nutrient cycling between corals and their zooxanthellal symbionts is important to the conservation of limiting nutrients, such as nitrogen, in oligotrophic reef waters. The tropical reef sponge *Haliclona cymiformis* forms an intercellular symbiosis with the red macroalga *Ceratodictyon spongiosum*, but it is unknown whether this association also promotes the cycling and conservation of essential nutrients. We therefore determined the potential importance of ammonium excreted by the sponge to the nitrogen-status and growth of the macroalga, using specimens collected from One Tree Island Lagoon on the Great Barrier Reef.

The association possessed the capacity to take up ammonium, nitrate and perhaps nitrite from the ambient seawater in the light. However these nutrients were commonly present at concentrations of less than 3 µM in the water at One Tree Island and so this seawater was probably only a minor source of nitrogen for the macroalga. In contrast, when the association was pre-incubated in darkness for 24hrs and its dark ammonium excretion rate measured, ammonium levels in the surrounding seawater (1 litre) increased from 0.25± 0.1µmol/g dry weight to 2.2±0.6µmol/g dry weight over a 6hr period; shorter dark pre-incubations resulted in lesser rates of ammonium excretion. It therefore appears that sponge waste is a major source of inorganic nitrogen for *C. spongiosum*, and this will be illustrated by means of a preliminary nitrogen budget. However, the enhancement of dark carbon fixation by ammonium (20µM NH_4Cl), which increases as algae become more nitrogen limited, suggested that *C. spongiosum* was still nitrogen-limited in One Tree Island Lagoon. The ammonium enhancement ratio of freshly-collected *C. spongiosum* was 1.4±0.06, which compared to a ratio of 1.5±0.07 for cultured *C. spongiosum* when deprived of inorganic nitrogen for one week; the ratio ranged from 1.1± 0.1 for cultured *C. spongiosum* supplemented with a regular source of nitrogen (100µM NH_4Cl) to 2.1±0.6 for cultured *C. spongiosum* deprived of nitrogen for 6 weeks.

We therefore propose that the situation in the *Haliclona-Ceratodictyon* symbiosis is analogous to that in corals and other zooxanthellate invertebrates, with the animal partner being an important source of nitrogen for the alga. Furthermore, when combined with evidence for the translocation of nitrogenous compounds from the macroalga to the sponge (Grant et al., in prep), it is evident that the cycling and conservation of nitrogen within the symbiosis may be an important factor in the success of this association in nutrient-poor habitats. ❐ *Porifera, sponge-macroalgal, nitrogen flux, nitrogen conservation, nitrogen budget*

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